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I, JULIE BILLINGSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003905393 for a patent by MICRONIX PTY LTD as filed on 03 October 2003.

WITNESS my hand this
Thirteenth day of October 2004

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PATENTS ACT 1990

PROVISIONAL SPECIFICATION FOR THE INVENTION ENTITLED:

"UNIVERSAL EQUIPMENT CLAMP"

This invention is described in the following statement:

This invention relates to clamps, in particular to clamps that are capable of being attached to supporting members of variable shape, orientation and cross-sectional area.

BACKGROUND

This invention relates to a conceptually simple mechanical device known as a clamp that can be used to attach a device, itself fixed to the clamp, to a supporting member. The attached device can have one or many uses and to some degree the use made of the attached device will determine the type of fixing used to locate the device in its most convenient position.

Clamps are often used for this type of task, as are clamp like brackets and fixed brackets.

A device that does not need to be subsequently moved can be permanently fixed using a bracket. Such brackets typically need a tool to loosen the device so that it can be repositioned to another similar bracket or removed.

The use of a clamp-like bracket can provide the convenience of a clamping mechanism, which will reduce the time to fix the device and clamp into position when compared to the time it takes to permanently fix a bracket. However, even these arrangements are not ideal, as a bracket adapted to accommodate the device is not always conveniently located for ease of use of the device. However, the variable adjustment aspect of a clamp mechanism can be useful to adapt the clamp like bracket to a supporting member that is of variable dimension or shape. In most cases, however, the variable adjustment clamping mechanism is used only once at the time of fixing.

In both the above cases, the device will likely be permanently fixed in location.

The manner in which the device is attached to the bracket or clamp-like bracket will also determine the amount of variability in orientation the device can have during its use. By way of example, it is possible to provide a pivotable connection, between the device and the bracket. If the device is a monitor screen, it can then be orientated to face towards any desired direction for observation during the use of the monitor. The orientation is, of course, limited by the mechanics of the pivot mechanism.

In many circumstances, this arrangement is adequate, as the monitor remains in the same physical location but can be orientated as required.

However, there are certain types of devices that need to be physically relocated while also needing to be orientated for convenient use and re-orientated as required during further use. In some further cases, the equipment needs to be quickly moved from one location to another.

One example is the preferable use of sphygmomanometer (blood pressure measuring device) that could be shared between a number of beds in the same ward. Most hospitals overcome this potential inconvenience by installing a sphygmomanometer adjacent to each patient's bed. However, this is only possible because of the relative cheapness of such a medical device and can not apply to very expensive medical monitoring equipment.

Thus, there is perceived to exist a need for a fixing mechanism that is attached to a device that is capable of being removably fixed to a variety of frame members having variable size and shape. It is also considered desirable that the fixing and release of the mechanism be simple and quick.

BRIEF DESCRIPTION OF THE INVENTION

In a broad aspect of the invention, a clamp comprises two opposing jaws located with respect to each other so as to be pivotally engaged at adjacent ends using a biasing means arranged such that said biasing means biases the free ends of said jaws apart, at least one threaded rod extending between said jaws wherein said rod is pivotally engaged to one said jaw intermediate the ends thereof, and wherein said rod passes through said other jaw, said rod further having a thread at the free end that extends the length of a maximum movement of said jaws towards each other, a rotatable knob located on the free end of said rod that is located along said thread so as to resist the movement of the adjacent jaw against said separating bias and rotatable along said thread so as to adjust the separation of said jaws.

In an aspect of the invention, said bias means is a leaf spring or a coil spring or a bent rod.

In another aspect of the invention, said biasing means maintains the adjacent ends of the jaws in close proximity.

In a further aspect of the invention, said knob has two areas along its length wherein a first area provides a surface shape adapted for being turned by a human operator to provide high torque to open or close the separation between said jaws and a second area provides a surface shape adapted for being turned by a human operator to provide relatively lower torque used to open or close the separation between said jaws.

In yet a further aspect of the invention, each jaw has gripping surfaces on facing surfaces.

In another aspect of the invention, said gripping surfaces are elastomeric.

In a further aspect of the invention, said gripping surfaces are removable to provide variable gripping depth and thus variable distance between said opposed gripping surfaces of said jaws.

In an aspect of the invention, an outer surface of a jaw is adapted for non-slip engagement with a substantially flat surface wherein said non-slip surface is located substantially opposite the location of said knob on said other jaw.

In a further aspect of the invention, a mounting means for attachment of a device is provided adjacent said bias means wherein said mounting means provides pivotable connection of said device.

A specific embodiment of the invention will now be described in some further detail with reference to and as illustrated in the accompanying figures. The embodiment is illustrative, and not meant to be restrictive of the scope of the invention. Suggestions and descriptions of other elements of the embodiment may be included within the scope of the invention but they may not be illustrated in the accompanying figures or alternatively features of the invention may be shown in the figures but not described in the specification.

BRIEF DESCRIPTION OF THE FIGURES

Fig. 1 depicts a perspective view of the clamp with the jaws open;

Fig. 2 depicts a central longitudinal cross-sectional perspective view of the clamp with the jaws open;

Fig. 3 depicts an off-centre longitudinal cross-sectional perspective view of the clamp with the jaws open;

Fig. 4 depicts a lateral cross-sectional view of the clamp along the rod that extends between the jaws of the clamp;

Fig. 5 depicts a perspective view of the clamp with the jaws closed;

Fig. 6 depicts a central longitudinal cross-sectional view of the clamp with the jaws closed;

Fig. 7 depicts an off-centre longitudinal cross-sectional perspective view of the clamp with the jaws closed;

Fig. 8 depicts a side view of the clamp showing the non-slip area on the outer surface of a jaw of the clamp;

Fig. 9 depicts the use of a clamp according to the invention on frame members of different orientation and size; and

Fig. 10 depicts the use of the clamp according to the invention as a stand for a device such as a monitor.

DETAILED DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

The invention is described by way of a single embodiment and, for ease of reference, a single application. It should be noted, however, that the particular arrangements of the elements of the clamp are depicted by way of example only and that there may exist one or more mechanical alternatives for those elements. The invention is also depicted having a particular use to support a device namely a computer monitor of the flat screen type, however, this is but one of innumerable uses.

The uses described in this specification are depicted in Figs. 9 and 10, wherein Fig. 9 depicts the clamp allowing the monitor to be mounted to a range of frame members that are of different dimensions and at different angles. Once the clamp is attached to the frame member, the pivotable connection between the clamp and the monitor allows the monitor to be angled to suit the user. Typically, this means that the horizontal axis of the monitor is set to the horizontal and the flat

plane of the monitor is set for ease of viewing by the user of the monitor which may be at an angle to the vertical.

The ability of the monitor to be set and subsequently maintain a desired angle in three degrees of freedom is achievable with the use of a suitable ball joint connection between the monitor and the clamp. The ball type joint mechanism can be tensioned to fix the position of the monitor or merely hold it in position but allows subsequent movement to another position. The tensioned ball joint mechanism is the subject of a patent application in the name of the present applicant and is incorporated by reference into this specification.

Like elements in the figures will be denoted with the same numeral.

Referring to Fig. 1, the clamp 10 is depicted in perspective with jaws 12 and 14 in an open state. The jaws are shown at their maximum separation from each other as is also depicted in Figs. 2 and 3.

A rod 16 is shown located at the approximate mid-point of the length of the jaws. The rod extends between the jaws, however, not shown in this figure, the rod is pivoted at one end with jaw 12 and passes through an aperture in jaw 14. A threaded end of the jaw terminates inside an internally threaded knob 18.

The adjacent ends of the jaws 12 and 14 are pivotably connected to an end block 20 and the jaws are biased apart by a spring element 22 as well as being engaged with respective gears on each jaw, so as one jaw moves so does the other. Thus, as the knob is turned, it translates along the length of the rod. If the translation is towards the pivotable end of the rod the jaws are moved towards each other aided by the geared engagement. The rotation of the knob closes the jaws if the knob is screwed along the length of the thread provided on the rod 16.

The inner surfaces of the jaws comprise a two part resilient construction, shaped so as to provide the ability to clamp to a wide variety of members having various cross-sectional areas (outer diameters may vary as well as their shape).

The clamp can also be used as a stand for the device it is attached to, in which case, the resting foot of the stand is provided by the outer-surface of jaw 12. A non-slip surface is incorporated into the jaw to assist this function. Fig. 10 depicts this particular function. In this embodiment, the non-slip surface is a rubber pad 24.

Referring to Fig. 2, the clamp 10 is depicted in perspective and in central longitudinal cross-section with the jaws 12 and 14 in an open state.

A rod 16 is shown extending between a pivot 26 in jaw 12 to a knob 18 shown located on the underside of jaw 14. The cavity 28, in which the pivot resides, is sized so as to allow the pivoted end of the rod to move from side to side, enough so that jaw 12 can move away from and towards jaw 14 unrestricted by the body of the jaw. Similarly, the aperture 30 is sized to allow the rod to move within the aperture in an unrestricted fashion while jaw 14 moves away from and towards jaw 12.

Not shown, is a thread along the end of the rod, that is the end opposite the pivot 26. A matching thread is located inside the knob. As the knob is turned in a clockwise direction (as determined from a view above the knob), the knob translates along the length of the rod and, at the same time, the rod is drawn to the inside of the knob. There is a semi-hemispherical shape on the bottom of the knob 18, which rests in a concave hollow in the top surface of jaw 14.

The concave hollow shape performs two functions:

- it allows the jaw to move relative to the knob with minimal friction against the rotational movement of the knob, and
- it allows there to be maximization of the closing force of the knob against the jaws, in particular jaw 14.

The knob 18 is provided with two regions of different shape.

The winged bottom portion 34 comprises two wing-like protrusions on opposite sides of the body of the knob. This portion allows the user of the clamp to make half turns of the knob using high torque because of the leverage provided by the distance of the ends of the wings from the coaxial axis-of-rotation of the knob.

The pointed top portion 36 comprises a gradually domed conical shape. This portion allows the user of the clamp to make rotations of the knob using smaller torque than available from the winged portion but which can effect quick adjustments of the clamp closure or opening motions. A user will likely use their thumb and forefinger to twirl the knob, at the rate desired, typically to quickly open the jaws before placing the clamp over the support member to be used. The user will then quickly close the jaws until some resistance is met as the jaws clamp more firmly about the support member. The user applies the final clamping force by rotating the knob using the wings on the lower portion of the knob.

The jaw elements are made from identical moulds, which assists to keep costs down. A consequence of this approach is that the cavity 28 is the same as the aperture 30. It will also be noted that the concave depression in jaw 14 is also in jaw 12 but covered over by the rubber pad 24 which requires two more apertures

to be formed in jaw 12 to accommodate the capture posts 24a and 24b of the pad 24.

In Fig. 2 the end block 20 is shown in greater detail than shown in Fig. 1 and in particular, shows the pivot construction comprising apertures 38 and 40 for the positioning of rotatable pins (not shown) that protrude from at least one inner side of the jaws.

The end block is shown as having a ball joint shaped attachment 42. The means of attachment of the ball joint housing to the device is not shown, but consists of a three-point screw arrangement. The ball joint is tensioned against the inside of the ball housing by back to back Belleville washers and adjustment of the tension is provided by adjustment of one or more of the screws.

Referring to Fig. 3, there is shown a cross-section along the length of the clamp slightly offset from its mid-line, so as to show further features of the clamp construction.

In this embodiment a leaf spring 44 is shown, a free end of the leaf elements each being housed in a cavity within a respective jaw. The leaf spring biases the jaws apart and it has been found that a 10-degree bias is preferable. A coil spring or a bent rod or other mechanical equivalents could alternatively provide a bias arrangement suitable to apply a separation force at all times whether the jaws are open or closed. It would also be possible to provide a coil spring between the jaws that is compressed at the time it is installed and therefore inclined to provide a basis for separating the jaws.

The adjacent ends of each jaw are shown as engaging each other. The engagement is provided by gear elements 46 and 48. These assist the jaws to

reciprocate their movement one to the other and ensure equal rotational movement about their respective pivots 50 and 52.

The inside surfaces of each jaw are padded with a two-part insert. Describing only one pair of inserts, 54 and 56, insert 56 abuts the ribbed internal shape of the jaw so as to provide one outer facing profile that can accommodate a variety of support member cross-sectional areas and shapes. In particular, the relatively deep contour at 58 will accommodate wider support members than will the smaller depth contour 60 located in insert 54. In fact, contour 58 accommodates insert 54.

The deep contour 58 is also shaped for the purpose of accommodating round as well as square cross-sectional shapes, as is to a degree, the contour 60. The shape shown has also been found to accommodate non-square and non-round support members.

The clamp as mentioned previously, can be used in a hospital environment as the particular size and shape of the inserts are designed to accommodate most of the support members that exist in such an environment. Examples of common clamping points are bed rails and posts, patient trolleys, wheeled hanging posts, tables and benches as well as operating room dollies for large moveable equipment.

The inserts are preferably made of elastomeric material, and in preference, they are made of neoprene rubber and of material with hard wearing characteristics.

Insert 56 is arranged to have grooves in locations that match the reinforcing ribs inside the jaw bodies and tabs that insert into reciprocal grooves in the jaw bodies so as to secure the insert, but allow it to be removed and replaced as

required. Insert 54 can have one or more tabs that insert into reciprocal apertures in the inner surface of contour 58 of insert 56 so as to secure the insert but allow it to be removed and replaced as required. Barbs on the tabs can add additional attachment force when combined with the use of tabs and grooves.

Like elements in the previous figures are depicted in Fig. 4, which shows a lateral cross-section along the rod 16 of the clamp 10 in a closed state.

Fig. 5 depicts a perspective view of the clamp with the jaws closed showing a space between opposite inserts that will accommodate the smallest diameter of support member capable of being clamped to.

Fig. 6 depicts a central longitudinal cross-sectional view of the clamp with the jaws closed.

Fig. 7 depicts an off-centre longitudinal cross-sectional perspective view of the clamp with the jaws closed. In particular, the gears at the substantially adjacent ends of the jaws 12 and 14 are fully enmeshed.

Fig. 8 depicts a side view of the clamp showing the non-slip pad 24 on the outer surface of a jaw of the clamp.

Fig. 9 depicts the use of a clamp according to the invention on frame members of different orientation and size. Once clamped, the universal joint allows the monitor to which it is attached to be orientated to a variety of positions to suit the user of the monitor.

The clamp is attached by opening the jaws quickly, this being an especially important requirement in the high-pressure hustle and bustle of a hospital.

Turning the top portion 36 of the knob 18 between the thumb and forefinger quickly opens the jaws of the clamp. The jaws are also separated by the bias means, as the knob translates along the length of the rod 16 to a separation distance that will allow the free ends of the jaws to go around the selected support member. The thumb and forefinger then turn the knob in the opposite direction, again at least initially quickly using the top portion of the knob, until the clamping tension builds and final tightening can be effected using the lower winged portion 34 of the knob.

The combination of the elastomeric inserts and the pressure provided by the knob on the jaws of the clamp ensure that the combined weight of the clamp, universal joint and attached device do not slip off or rotate on the support member whatever orientation that member may have. The device is then positioned to suit the user's requirements almost regardless of the clamp orientation.

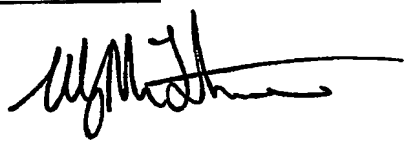
There are some limitations of movement caused by the configuration of the universal joint. The housing for the ball joint is particularly shaped to allow the post protruding from the ball to slide into a slot 62 (Figs. 1, 3,4 and 5) that allows the clamp to lay against the rear of the device. This position of the clamp is used when the device is stored or while it is being moved to another location.

Fig. 10 depicts the use of the clamp according to the invention as a stand for a device such as a monitor. In this example, the base of the device attached to the clamp is located on, preferably, a flat surface and the clamp is positioned so that the non-slip pad 24 is also on the flat surface. Such an example is illustrated by the need for the user of the monitor to shift from a position next to a bed to a work desk for administrative purposes or to a bed side table if no suitable support members are conveniently located.

It will be appreciated by those skilled in the art, that the invention is not restricted in its use to the particular application described. Neither is the present invention restricted in its preferred embodiment with regard to the particular elements and/or features described or depicted herein. It will be appreciated that various modifications can be made without departing from the principles of the invention. Therefore, the invention should be understood to include all such modifications within its scope.

Dated this 3rd day of October, 2003.

MICRONIX PTY LTD
By its Patent Attorneys
MADDERNS



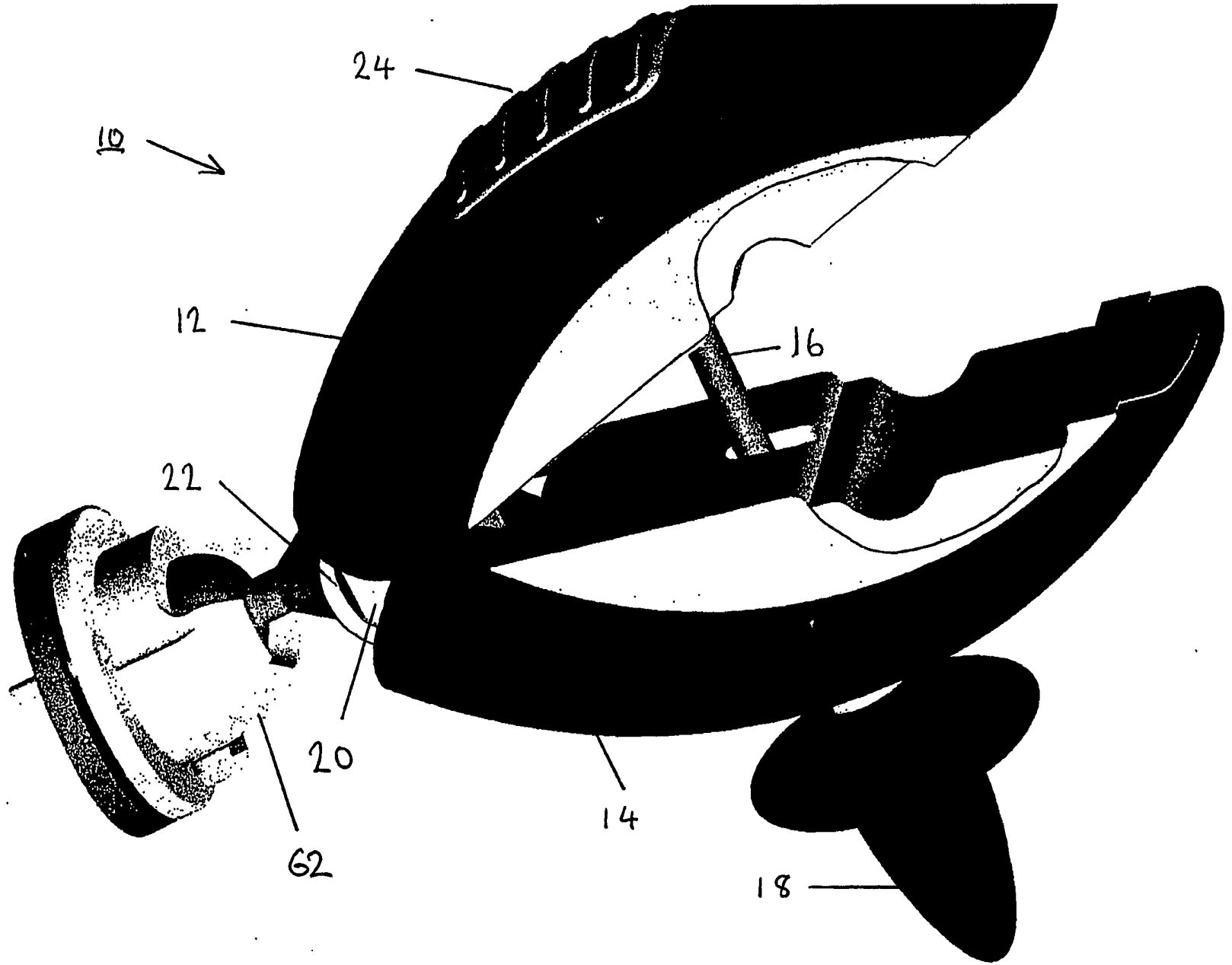


FIG. 1

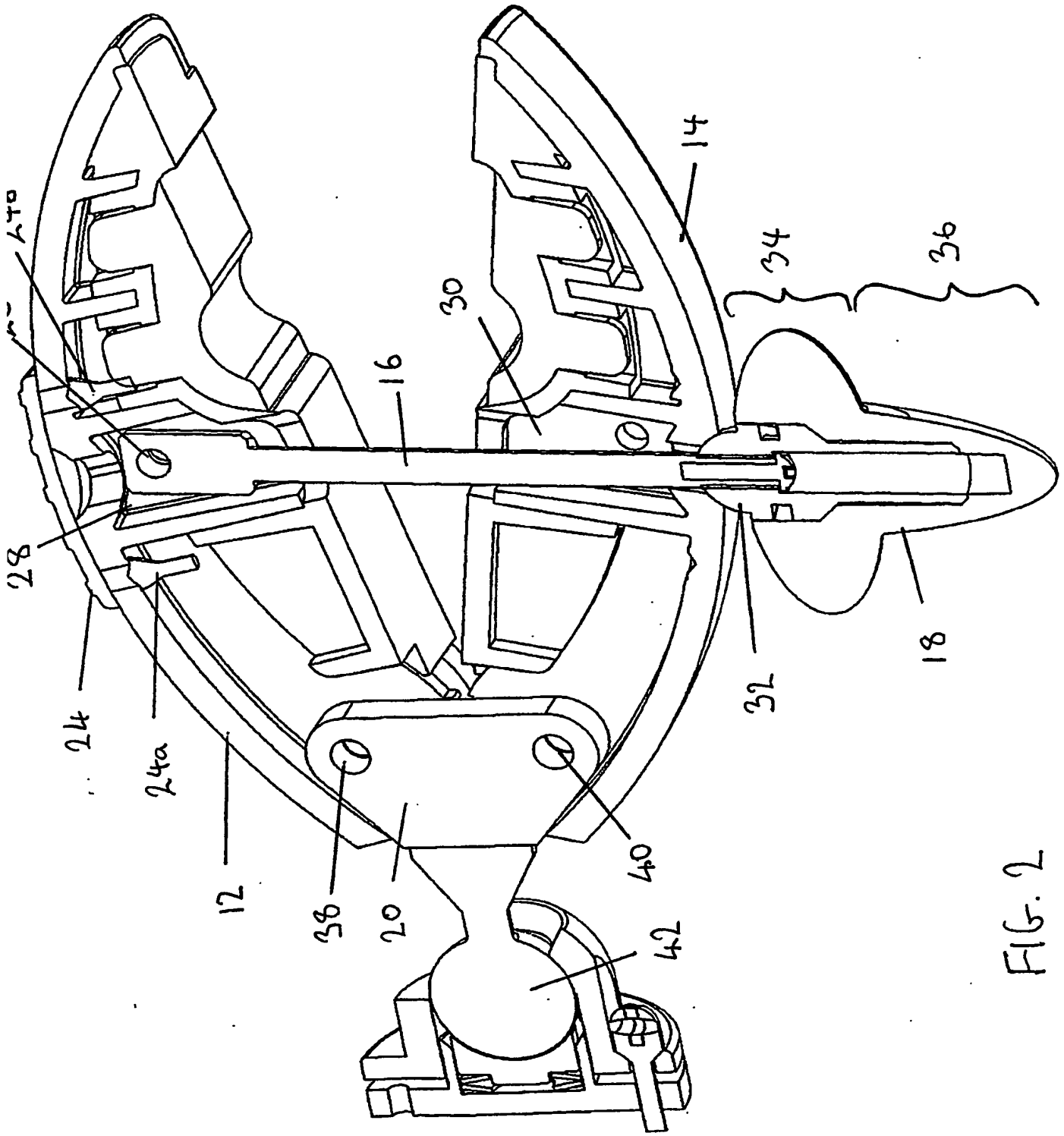


FIG. 2

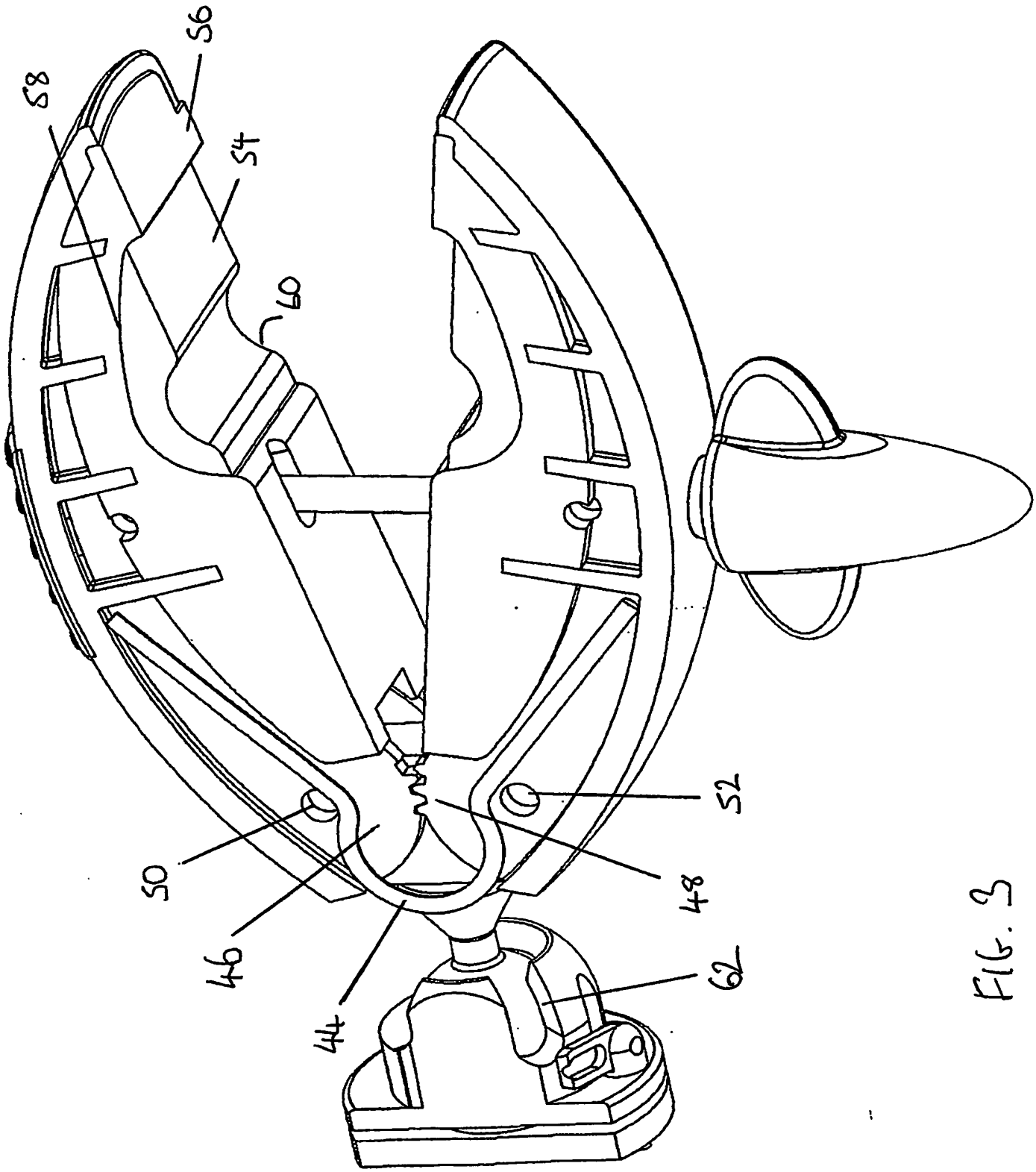


FIG. 3

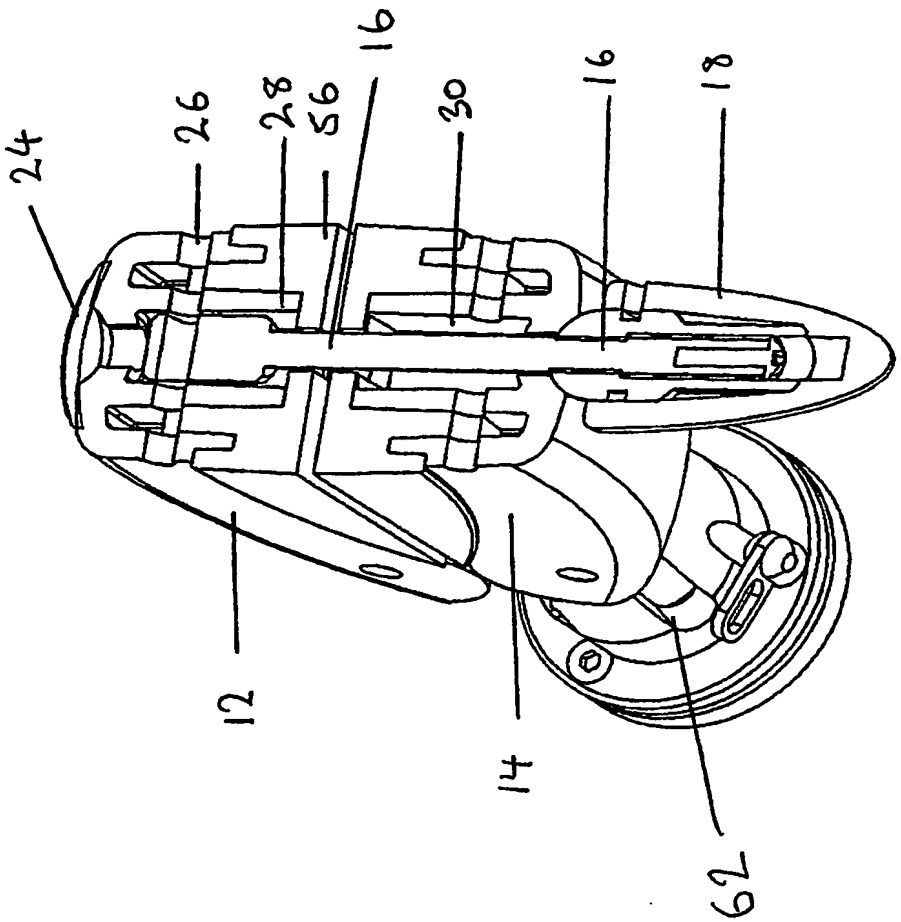


FIG. 4

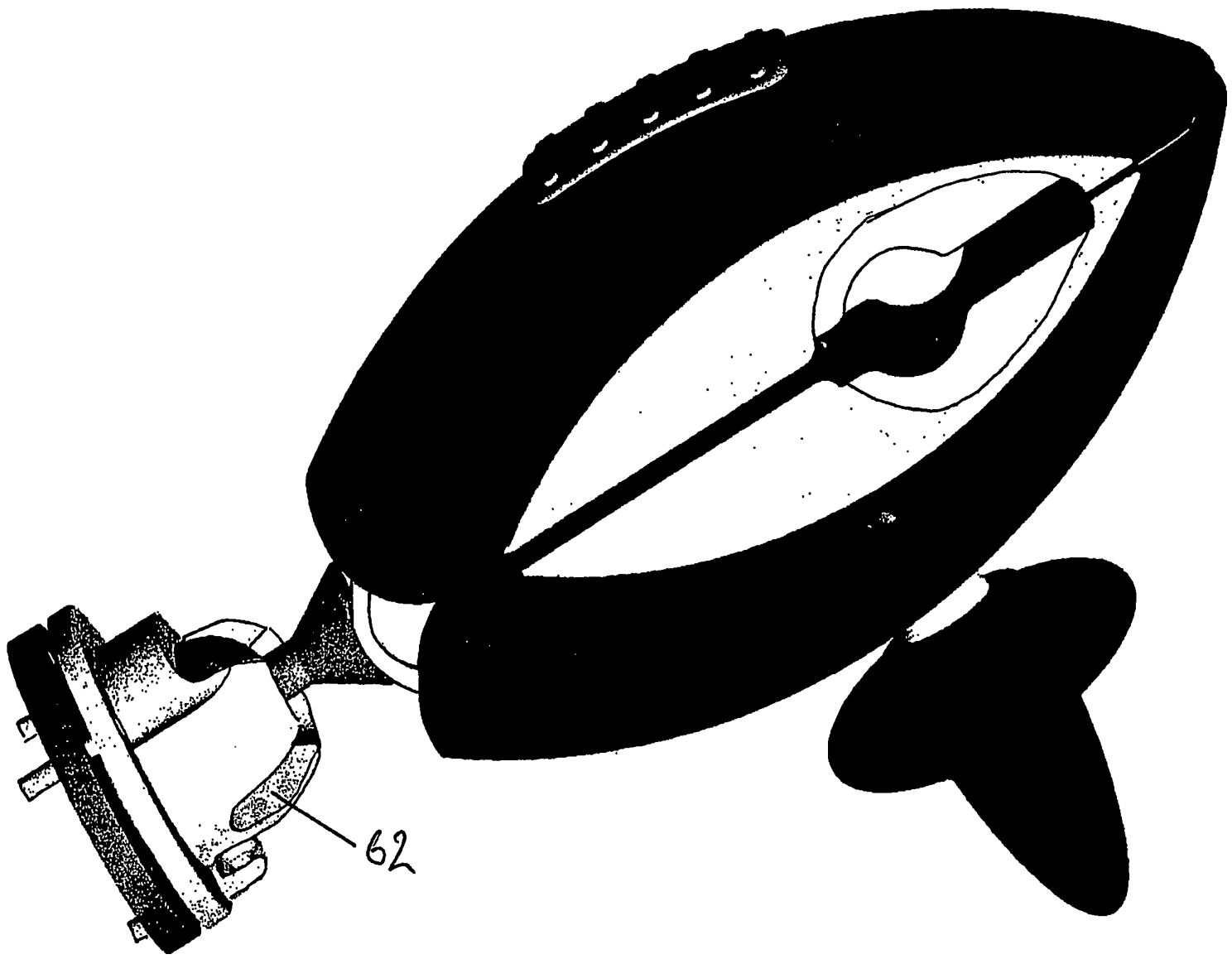


FIG. 5

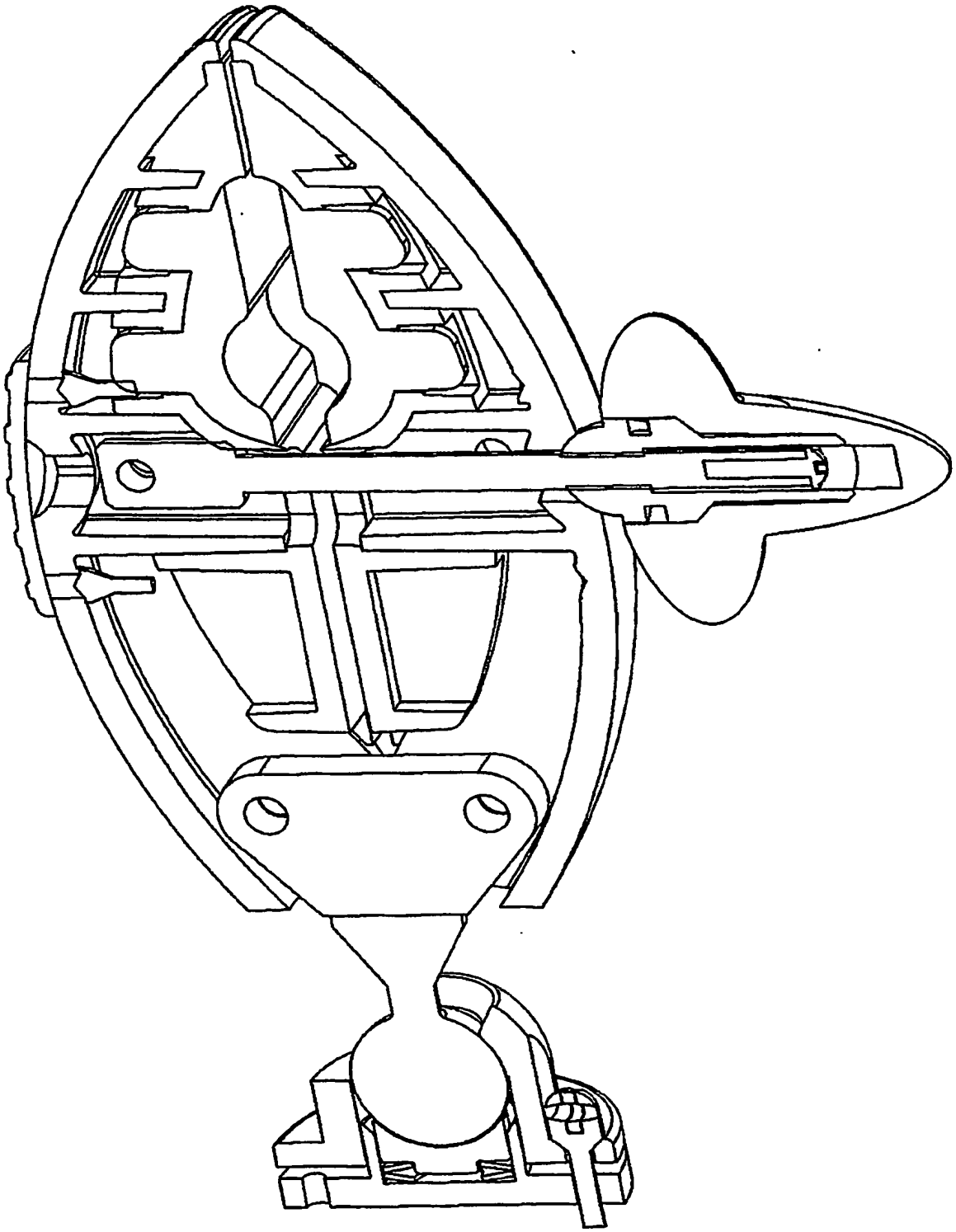


FIG. 6

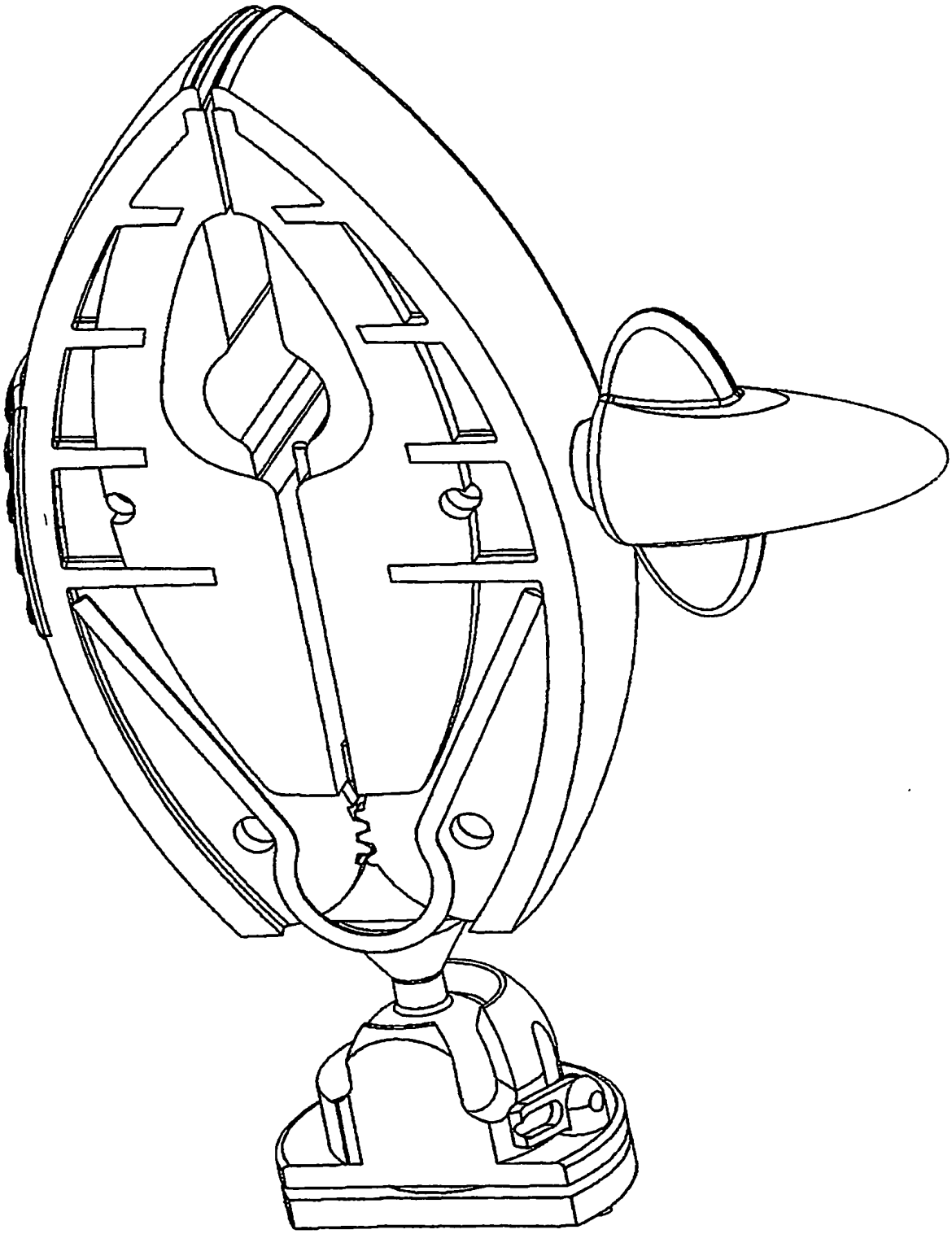


FIG. 7

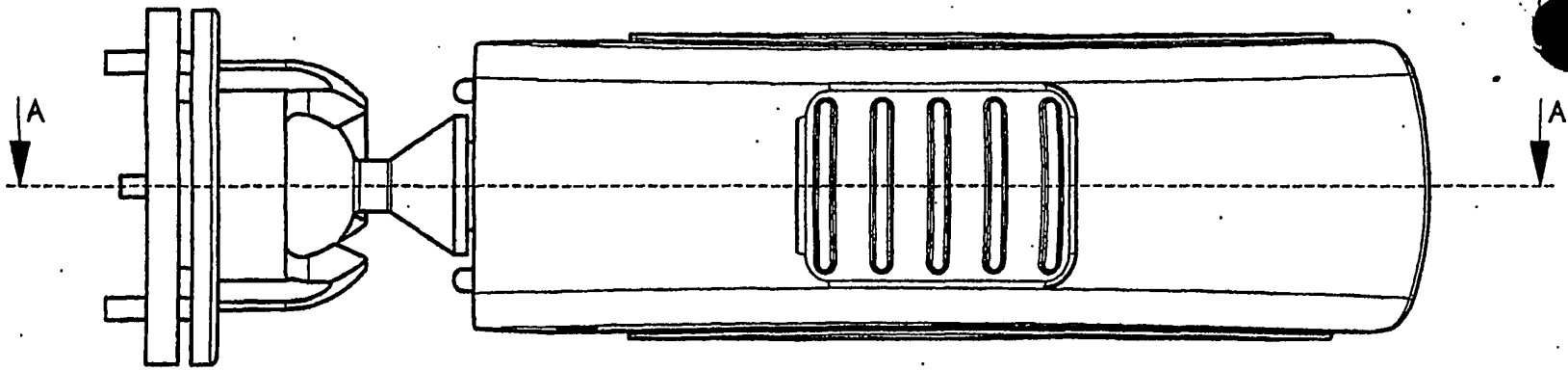


FIG. 8

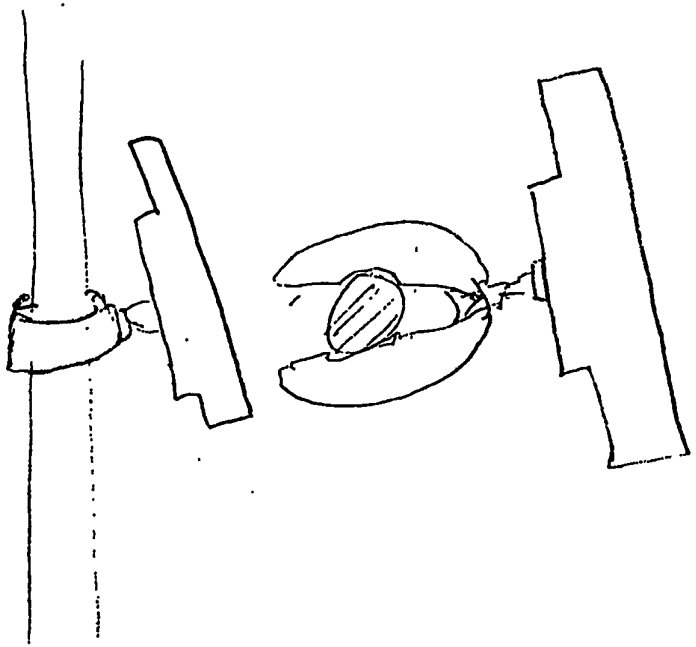


FIG. 9

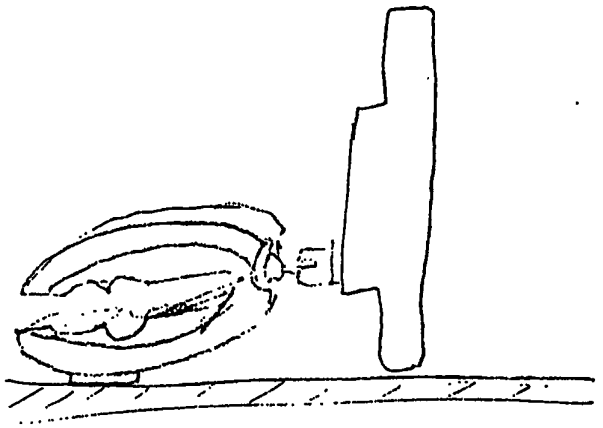


FIG. 10